

Design and fabrication of quadrilateral bubble column test rig for multiphase flow investigations

ABSTRACT

Bubble column reactor belongs to the general class of multiphase reactors in which gas come in contact with liquid. This reactor purposely used to mix the two phases or substances where the gas is dispersed into the column from the bottom and rises within the liquid and escapes from the upper liquid surface. Throughout the design and development phase, the reactor design specifications were identified to meet the experimental requirements for hydrodynamics study in a bubble column using the high-speed camera, industrial radiotracer, and radioactive particle tracking techniques. This bubble column reactor design comes with six different type of sparger design for various mixing pattern optimization. The design methodology structured as design development process, conceptual design selection process, detailed design specifications, product fabrication, and final product testing. This versatile reactor is developed to overcome the problems faced in understanding hydrodynamics behavior of using different types of sparger design, leading to design optimization for better mixing and blending efficiency in multiphase flow investigations. This study has demonstrated that the newly quadrilateral bubble column reactor is ready to be used for the various types of laboratory assessment including industrial radioactive experiments.

Keyword: High-speed camera; Industrial radiotracer; Radioactive